THE VIBRATION OF THE RATTLESNAKE'S TAIL.

By ISAAC OTT, M.D.

THE rapidity of movement of the wings of insects has been the subject of investigation by Marey. No one, as far as I know, has made any inquiries about the rapidity of the movement of a rattlesnake's tail. The noise of the rattlesnake must not be confounded with the rapidity of movement of the tail or rattle; for the rattle is composed of flattened, hollow, spherical, horny shells, which, striking against each other, set up their own vibration, which makes the noise. My investigations simply determine how often the swing of the rattling shells takes place. It is like determining how often the child swings his rattle, and not the noise or note of the rattle itself. The snake experimented with was one which had been kept about nine months, and was not as energetic as one recently caught, but the note of his rattle was as usual. His head was secured by means of a wire around the neck, and at the end of his rattle was attached a short piece of thin copper wire by means of sealing-wax; then the tail was taken in hand, and the point of the copper pen directed against the smoked revolving drum of a Marey-Secretan apparatus. A tuning-fork was run over the drum to determine the rate of movement of the drum. By an analysis of the curve it was found that the rate of vibration of the tail was about sixty per second. The resistance from the friction of the pen against the drum may have had some influence in lowering the rate of vibration, but the muscular power is so great, and the weight of the tail considerable, that the heavy body, once set in vibration, is not much affected by friction in this case. The extent of the vibration also has an effect upon the frequency, and the greater the extent of the vibration, the greater the resistance. All these causes may make the normal number of vibrations seem less than they actually are, but it seems to me that they are of but little import, because of the weight of the tail and the powerful muscular force driving it.

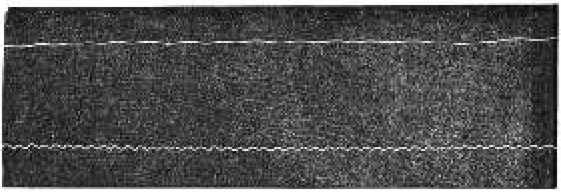

FIG. 1—Gives the vibration of the rattle on a rapidly revolving cylinder. The lower curve gives the tuning-fork vibration one two hundred and fortieth of a second.

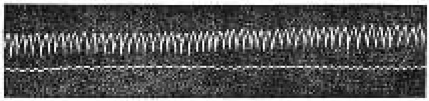

FIG. 2—Gives the curve of the rattle on a slowly revolving drum ; the upper curve is that of tuning-fork one sixtieth of a second.

To confirm this view I removed a screw from one arm of the tuning-fork, and attached to the arm, by means of sealing-wax, the amputated rattle of the snake. The tuning-fork was one beating sixty single vibrations per second, so that the rattle was swung backward and forward at that rate. No difference in note could be detected between the rattle run by my tuning-fork and that run by the nervo-muscular apparatus of the living animal. The extent of the vibration exemplified also how the snake changed the intensity of the sound of his rattle. I might add that in handling the snake during these experiments he frequently ejected a fine spray from the glands about the cloaca, which was of a penetrating odor.